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Reconstruction for Chronic Dysfunction of Ileoanal Pouches

Eric W. Fonkalsrud, MD, and Joaquim Bustorff-Silva, MD

From the Department of Surgery, UCLA School of Medicine, Los Angeles, California

Objective

A retrospective review was performed to determine the results after surgical reconstruction for chronic dysfunction of ileal pouch-anal procedures for ulcerative colitis and familial colonic polyposis at a university medical center.

Methods

During the 20-year period from 1978 to 1998, 601 patients underwent colectomy and ileal pouch–anal anastomosis (IPAA) for ulcerative colitis, familial colonic polyposis, or Hirschsprung's disease. A J pouch was used for 351 patients, a lateral pouch for 221, an S pouch for 6, and a straight pull-through for 23. Acute complications after pouch construction have been detailed in previous publications and are not included in this study. Chronic pouch stasis with diarrhea, frequency, urgency, and soiling gradually became more severe in 164 patients (27.3%), associated with pouch enlargement, an elongated efferent limb, and obstruction to pouch outflow, largely related to the pouch configuration used during the authors' early clinical experience. These patients were sufficiently symptomatic to be considered for reconstruction (mean 68 months after IPAA). Transanal resection of an elongated IPAA spout was performed on 58 patients; abdominoperineal mobilization of the pouch with resection and tapering of the lower end (AP reconstruction) and ileoanal anastomosis on 83; pouch removal and new pouch construction on 7; and conversion of a straight pull-through to a pouch on 16.

Results

Good long-term results (mean 7.7 years) with improvement in symptoms occurred in 98% of transanal resections, 91.5% of AP reconstructions, 86% of new pouch constructions, and 100% of conversions of a straight pull-through to a pouch. The average number of bowel movements per 24 hours at 6 months was 4.8. Complications occurred in 11.6% of reconstructed patients. Five of the 164 patients (3.1%) required eventual pouch removal and permanent ileostomy. The high rate of pouch revision in this series of patients undergoing IPAA is due to a policy of aggressive correction when patients do not experience an optimal functional result, or have a progressive worsening of their status.

Conclusions

Although occasionally a major undertaking, reconstruction of ileoanal pouches with progressive dysfunction due to large size or a long efferent limb has resulted in marked improvement in intestinal function in >93% of patients and has reduced the need for late pouch removal.

During the past two decades, colectomy and ileal pouch–anal anastomosis (IPAA) has become accepted in most large medical centers in the United States and in Europe as the operation of choice for patients with severe ulcerative colitis refractory to medical therapy, and for patients with familial colonic polyposis.[1–3] There have been many refinements in the operative technique and postoperative management during the past 15 years, and currently many major medical centers report that >92% of patients have a good long-term outcome. Nonetheless, complications after the procedure are common, even in centers where the operation is performed frequently.

Many early postoperative complications, such as pouch leak, pelvic abscess, anastomotic disruption, pouch fistula, pouch enlargement, recurrent pouchitis, and pouch hemorrhage, have been reported after IPAA.[4,5] In one study, 20% of pouch complications were severe enough to require pouch excision.[6] Other reports indicate a similar incidence of complications, with pouch failure rates ranging from 4.4% to 13.2% in large experiences.[1,7–9] Reconstruction of ileoanal pouches that have severe complications or that are not functioning satisfactorily has recently been reported by a few authors; this has reduced the need for pouch excision and a permanent ileostomy.[6,10–17] The majority of these

Correspondence: Eric W. Fonkalsrud, MD, Department of Surgery, UCLA School of Medicine, Los Angeles, CA 90095.
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reports have focused on early acute complications after IPAA.

As clinical experience with IPAA has expanded, the majority of patients have experienced good or excellent results with four to six movements per day and zero or one at night, with rare soiling. As the length of follow-up has increased, however, occasional patients with initially good results using a variety of different pouch configurations have been noted to develop increasing stool urgency and frequency with periodic soiling a few years after pouch construction. Several patients who had the IPAA constructed >8 years ago with S, lateral, W, or other pouch configurations (before the J pouch became standard), who had minimal early complications, have developed sufficiently severe symptoms from chronic pouch malfunction that they have required a diverting ileostomy, with or without pouch removal.[10,11,15,16]

Little attention has been directed to the surgical management of patients with progressive pouch dysfunction related to pouch design that favors development of stasis. Certain mechanical factors related to pouch design that cause chronic partial obstruction to outflow, such as a long and/or broad pouch and an elongated spout, appear to promote stasis and cause the patient to strain during defecation and experience incomplete and delayed pouch emptying. Such patients often develop diarrhea, increased stool frequency, urgency, soiling, and perineal irritation in the absence of pouchitis. Optimal long-term IPAA function appears to be related to construction of a short ileal pouch with only two loops, absence of an ileal spout, and aggressive correction of postoperative rectal sinuses and strictures. Reconstruction of chronically symptomatic patients with poorly functioning pouches to conform to these characteristics has resulted in a marked improvement in intestinal function, and has dramatically reduced the need for a permanent ileostomy.[6,10–17]

This report summarizes our clinical experience with the reconstruction of ileal pouches with chronic dysfunction largely due to pouch design, and indicates that aggressive correction of these pouches may result in good to excellent long-term function in the majority of patients.

PATIENTS AND METHODS

During the 20-year period from 1978 to 1998, 523 patients with ulcerative colitis, 66 with familial colonic polyposis, 8 with Hirschsprung's disease, and 4 with colonic neuronal intestinal dysplasia underwent total colectomy, mucosal proctectomy, and IPAA at UCLA Medical Center. Of these 601 patients, 139 were 18 years or younger at the time of operation (range 2 to 76 years). There were 326 female patients and 275 male patients. A J pouch was used on 351 patients, a lateral pouch on 221, an S pouch on 6, and a straight pull-through without pouch on 23. Sixteen of the patients with a straight pull-through underwent subsequent mobilization of the ileum from the pelvis and one-stage reconstruction to a pouch (nine to a J, seven to a lateral pouch) because of excessive stool frequency, urgency, and soiling, increasing the number of J pouches to 360 and lateral pouches to 228.[18]

Several changes in the surgical technique for constructing the IPAA have evolved during the 20 years of the study.[19,20] Between 1978 and 1985, 6 early patients had S pouches and 19 others had straight pull-through procedures. During this period, 111 patients underwent construction of a lateral isoperistaltic pouch; the ileal spout was 3 to 5 cm long, the pouch 15 to 30 cm long. The rectal muscle cuff varied from 2 to 6 cm. Between 1985 and 1991, another 110 patients had a modified lateral pouch <14 cm long, with an ileal spout <2 cm and a rectal muscle cuff of 4 to 5 cm. After 1988, only 12 lateral pouches were constructed, and since 1991 a J pouch has been used routinely.

There were no deaths related to the operation in the perioperative period or in long-term follow-up with any of the IPAA configurations. Major early complications after the S and lateral IPAA included pouchitis (18%); steroid withdrawal symptoms (14%); adhesions, internal hernias, or intussusception (9%); wound infection (7%); pelvic sinus tracts (5%); ileostomy obstruction or dysfunction (3%); and intestinal leak or perforation (0.5%). Sixteen of the 601 patients had pouch failure or severe complications during the first 2 years after ileostomy closure and underwent permanent ileostomy with or without pouch removal (2.7%).

Chronic dysfunction that became increasingly severe a few years after pouch construction was associated with pouch enlargement due to initial construction of a pouch >14 cm long and to gradual ileal spout elongation, which caused stasis and partial obstruction to outflow in 43% of patients with S or lateral pouches (Fig. 1). Most of these patients found it necessary to strain or apply pressure to the lower abdomen to defecate, often taking >3 minutes. There was often a sensation of incomplete emptying accompanied by an increase in stool frequency, urgency, gas, diarrhea, and occasional nocturnal incontinence. Twelve patients had episodes of pouchitis >2 years after pouch construction; most improved with administration of oral metronidazole, rectal irrigations with tap water, and occasional Rowasa enemas. Antiperistaltic medications, such as loperamide (Imodium), diphenoxylate hydrochloride with atropine (Lomotil), or codeine, provided transient relief of stool frequency but led to habituation with higher tolerance thresholds and were ineffective in relieving the chronic pouch dysfunction. Chronic pouch dysfunction occurred in 159/523 patients with ulcerative colitis and only 5/66 patients with polyposis.

Pouch Reconstruction

During our early clinical experience, 4 of the 111 long lateral pouches were removed from 13 to 68 months after

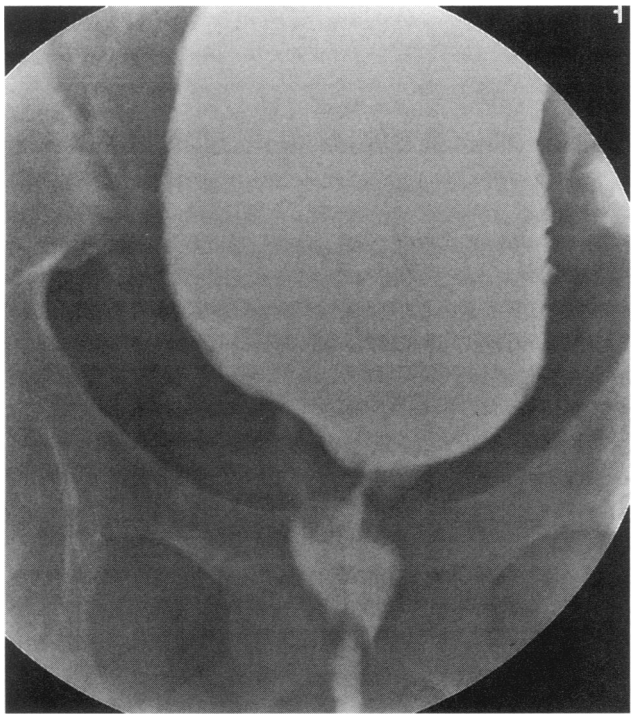


Figure 1. Contrast enema from 28-year-old woman 6 years after construction of a lateral ileal pouch, showing elongated ileal spout that caused outflow obstruction. Transanal resection of the spout improved the patient's pouch function markedly.

surgery and a permanent ileostomy was constructed because of persistent symptoms. Because it became apparent that additional patients would require return to an ileostomy, abdominoperineal mobilization of the pouch and spout from the pelvis with shortening and tapering of the pouch (AP mobilization) was performed on 64 of these 111 patients (Fig. 2). Mobilization of the pouch from the pelvis was performed with remarkable technical ease in the majority of patients, facilitated by the use of Bovie forceps or the harmonic scalpel. The lower 30% to 60% of the pouch was resected, leaving the remaining pouch approximately 12 to 13 cm long (Fig. 3). Transanal mobilization of the ileal spout from the rectal muscle canal down to the ileoanal anastomosis was often performed more easily than the original rectal mucosectomy unless there was chronic infection or sinus tracts in the pelvis adjacent to the pouch. The antimesenteric side of the lower end of the pouch was tapered to make the distal open end the appropriate size for the ileoanal anastomosis. In a few patients with very dilated pouches, the tapering was carried out almost the full length of the pouch. The repair was performed with two layers of interrupted absorbable suture (Maxon), and the ileoanal anastomosis was hand-sewn with interrupted Vicryl sutures. The ileal mesentery extending to the pouch was almost invariably somewhat longer than at the initial operation; however, further mobilization high into the upper abdomen was performed when necessary to make reconstruction of the ileoanal anastomosis feasible without tension. Enlarged lymph nodes in the distal ileal mesentery and pelvic scar tissue commonly caused compression of the ileal spout and lower end of the pouch and were removed whenever feasible.

In three patients, the lateral pouch could not be reconstructed satisfactorily, and a new pouch was made. Five of the 64 reconstructed patients received a diverting ileostomy because of poor general health at the time of operation or because of the complexity of the reconstruction. A transanal soft rubber drainage catheter (size 30F) was left in place for 5 days, when a Gastrografin contrast study was performed through the catheter to identify any anastomotic leaks or sinus tracts. Pelvic drainage and postoperative care were carried out in the same manner as for the initial pull-through operations. No steroids were used for the majority of patients undergoing pouch reconstruction. Within 4 to 6 weeks, rectal dilatation with a size 19 Hegar dilator was initiated and carried out twice weekly for several weeks or

Figure 2. Elongated lateral pouch with spout mobilized from the pelvis of a 42-year-old woman 7 years after construction. The lower half of the pouch with spout was resected at the level of the clamp, tapered, and reanastomosed to the anus.

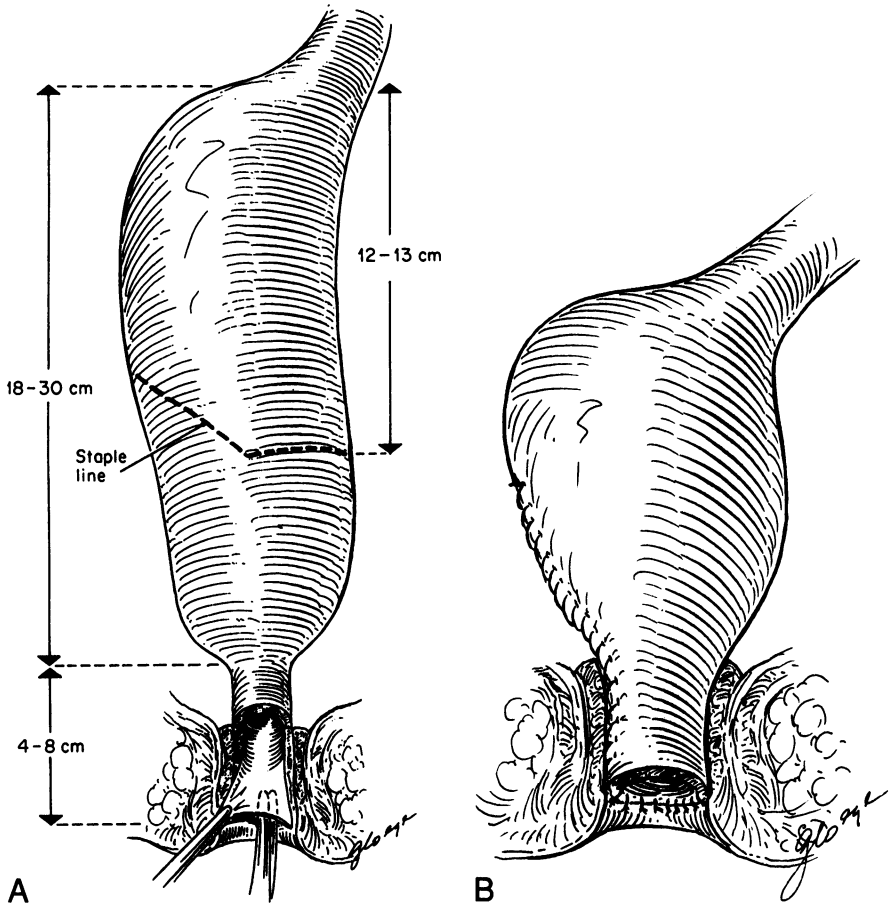


Figure 3. (A) Technique of abdominoperineal mobilization of the lateral ileal pouch from the pelvis and rectal canal. Note line of resection and tapered reconstruction of pouch. (B) Reconstructed lateral pouch brought through the rectal muscle cuff and anastomosed to the anus at the level of the dentate line.

months, if necessary, in patients in whom the dilator could not be passed easily.

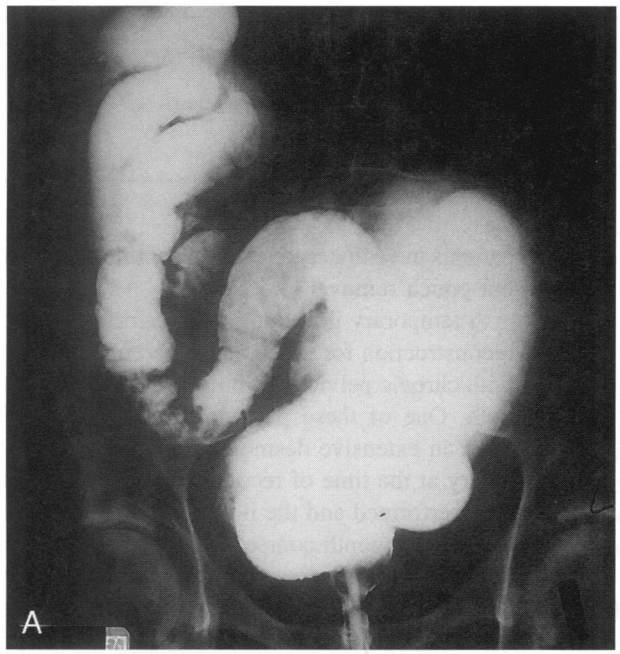
For 26 of the initial 111 patients with an ileal spout >2.5 cm and a pouch <18 cm, transanal mobilization and resection (TAR) of the spout with downward advancement of the lower end of the pouch to the anus was performed. Transanal drainage of the pouch with a size 30 Foley catheter for 1 to 2 days was used for 24 of the patients. None of the patients who underwent TAR required a temporary diverting ileostomy or pouch removal. The hospital stay was 1 to 3 days.

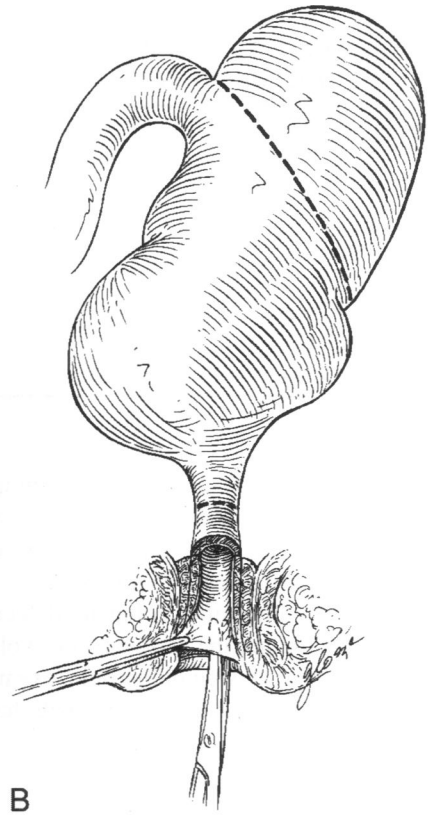
Of the last 117 patients with lateral pouches, 14 underwent AP reconstruction with anastomosis of the lower end of the tapered pouch to the anus. Another 32 of these 117 patients underwent TAR of the spout with reanastomosis to the anus. Thus, 139 of the initial 221 patients with a lateral pouch, plus 7 who were converted from a straight pull-through to a lateral pouch (61%), have undergone late reconstruction of the pouch because of persistent symptoms related to pouch size or a long efferent limb. The mean follow-up for these 139 reconstructed patients is 6.9 years.

Three of the six patients with S pouches underwent AP reconstruction with reanastomosis to the anus (Fig. 4). One patient underwent pouch excision with reconstruction to a lateral pouch, and two underwent pouch excision with permanent ileostomy. Only 5 of the 351 patients with an initial J pouch, plus 9 who were converted from a straight pull-through, each from our early experience when the pouch length exceeded 14 cm, have undergone reconstruction with AP mobilization from the pelvis. Two of these patients underwent partial resection and reconstruction with ileoanal anastomosis. Three patients with J pouches required pouch removal and construction of a new pouch.

RESULTS

Pouch reconstruction was performed from 13 months to 11 years after the initial IPAA (mean 68 months) for the 139 patients with a lateral pouch, 4 with an S pouch, 5 with a J pouch, and 16 with a straight pull-through converted to a J or lateral pouch (Table 1). With a mean follow-up of 7.7 years (range 1 to 15 years), the long-term functional results have been very similar to those observed in our hospital with an initial J pouch (95% good results). Good to excellent results include the following: six or fewer movements per 24 hours; less than one staining episode per 2 weeks; does not wear a pad in underclothes; can defer defecation for >1 hour after the initial urge; can void without having a movement; can often pass gas without a movement; has minimal straining to empty and rarely takes >2 minutes; can eat a normal diet; can exercise vigorously; has rare diarrhea; and has <15 ml fecal volume in the pouch after





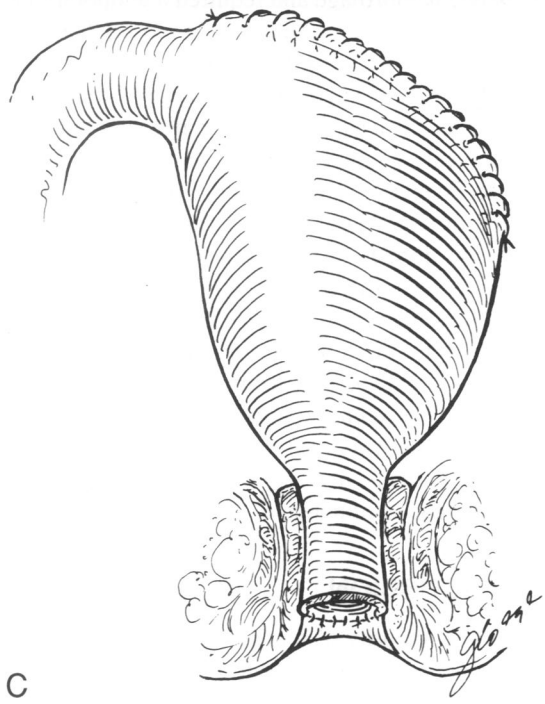


Figure 4. (A) Enlarged S pouch mobilized from a 51-year-old symptomatic man 5 years after pouch construction. (B) Technique of S-pouch mobilization from the same patient. (C) S-pouch reconstruction.

defecation, as measured by sigmoidoscopy. All but one of the 58 patients with TAR of the ileal spout with ileoanal reanastomosis were considered to have good to excellent results (Table 2). Seventy-six of the 83 patients undergoing AP reconstruction of the pouch had a good result, as did 6 of the 7 patients undergoing pouch removal and new pouch construction, and each of the 16 patients undergoing conversion of a straight pull-through to a J or lateral pouch.

The average number of movements per 24 hours was 5.9 3 months after pouch reconstruction and was 4.8 at 6 months. Fewer than 10% have more than one staining or soiling episode per week at 6 months. Eighty-four percent

Table 1. TYPES OF POUCHES RECONSTRUCTED FOR CHRONIC MALFUNCTION

Type of Original Pouch	No. Constructed	No. Reconstructed	%
S pouch	6	4	66
J pouch	351 + 9*	5	1.4
Lateral pouch	221 + 7*	139	61
Straight pull–through	23	16	70
TOTAL	601 + 16	164	27

* Patients with a straight pull–through converted to a pouch.

can delay defecation for up to 1.5 hours after the initial urge. Eighty-two percent can urinate without having a simultaneous defecatory movement; 64% can pass flatus without having a movement. Ninety percent routinely take <2 minutes to empty. When examined after voluntary defecation at the time of routine follow-up, the residual stool volume in the pouch as determined at sigmoidoscopic examination rarely exceeded 15 ml. The majority of patients have unlimited physical activity.

Complications after the IPAA reconstruction are shown in Table 3. One patient died within 3 days after AP pouch reconstruction as a result of a massive pulmonary embolus. There were no other deaths after initial pouch construction or after reconstructive operations. Major complications occurred in 19 patients (11.6%), and 17 required a reoperation. Rectal dilatation with a size 19 Hegar dilator by the patient at home for a few weeks is almost routine and is not considered a complication of operation. Only 5 of the 83 patients undergoing AP reconstruction have been returned to a permanent ileostomy (6%) because of complications or chronic pouch malfunction (mean 4.2 months after surgery). Two of these 5 patients undergoing pouch removal were initially diagnosed as having indeterminate colitis and were found to have histologic features of Crohn's disease in the resected specimen. Thus, 21 of the total series of 601 IPAA

Table 2. TYPE OF POUCH RECONSTRUCTION

Operation	No. of patients	Mean Follow–up (yrs)	% Good Results
Transanal resection of spout	58	6.3	98
AP resection of distal pouch with tapering & new IA anastomosis	83	7.7	91.5
Pouch removed & new pouch constructed	7	8.2	86
Straight converted to pouch	16	11.4	100
TOTAL	164	7.7	95

Table 3. COMPLICATIONS AFTER ILEOANAL POUCH RECONSTRUCTION (164 PATIENTS)

	No. of Patients	%
Major complications	19	11.6
Reoperations	17	10.4
Permanent ileostomy (pouch removed)	5	3.0
Transient ileostomy	7	4.3
Death within 1 month	1	0.6

patients have undergone permanent ileostomy, with or without pouch removal (3.5%).

A temporary ileostomy was performed at the time of AP reconstruction for six patients who had complex operations with chronic pelvic inflammation or extensive scar tissue or both. One of these patients with polyposis was found to have an extensive desmoid tumor in the small bowel mesentery at the time of reconstruction; resection of the tumor was performed and the ileostomy was closed after completion of a 9-month course of chemotherapy. Another patient had an ileostomy constructed 6 weeks after AP reconstruction because of a leak from the pouch with pelvic inflammation. One patient with factor XI deficiency developed a pelvic hemorrhage and required a temporary ileostomy for 3 months. The ileostomies were closed 4 to 11 months after surgery in five of the patients.

Seven female patients had large ovarian cysts (>15 cm in diameter) that caused pelvic fibrosis with compression of the ileal pouch. Three patients required ovarian cyst resection after AP reconstruction. Four patients underwent reoperation for lysis of adhesions. One patient had extensive pelvic fibrosis that made reservoir reconstruction very difficult, resulting in transection of a ureter; this was recognized and repaired primarily. A diverting ileostomy was used for 4 months. Seven patients developed a sinus tract extending superiorly from the ileoanal anastomosis 1.5 to 4.5 cm between the pouch and the rectal muscle cuff; four of these patients required marsupialization of the sinus. Two male patients developed retrograde ejaculation, but none experienced impotence.

DISCUSSION

The majority of reports concerned with the salvage management of ileoanal pouches with major complications relate to the early period after pouch construction or after ileostomy closure.[4–6,9,17] Few reports, however, have described reconstruction for chronic pouch dysfunction years after IPAA.[10–17] Several patients in our clinical experience who had initially good functional results developed increasing stool urgency, frequency, and periodic soiling several years after pouch construction. These symptoms correlated with the progressive development of partial obstruction to

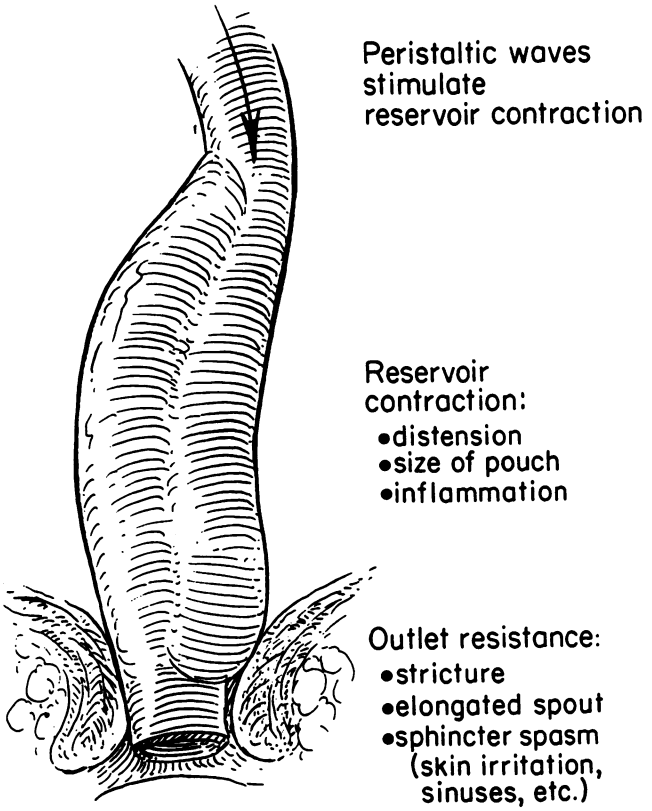


Figure 5. Factors affecting ileal pouch–anal function. Pouch contraction is reduced by large size, distention, and inflammation. Outlet resistance further reduces the efficiency and completeness of pouch emptying.

pouch outflow and pouch enlargement with stasis and incomplete emptying. The majority of these patients underwent IPAA >8 years ago, when the S and lateral pouches were commonly used and before the short J-pouch configuration without an efferent spout had become standard.

On the basis of clinical observations and animal research studies, certain concepts of ileal pouch function have become apparent.[11,20] Peristaltic waves from the normal ileum immediately proximal to the pouch stimulate pouch contraction (Fig. 5). If the pouch is short, a moderate contraction often may occur, causing almost complete emptying of the pouch. If the pouch is large or dilated, the ileal peristaltic wave may be dissipated in the upper portion of the pouch, squeezing out only a small amount from the lower end. Meaningful contraction of the pouch may be further reduced by distention, large size, or chronic inflammation. Complete pouch emptying is also adversely affected by outlet resistance from any cause, including stricture, elongated spout, or sphincter spasm due to perianal sinuses, fissures, or chronic skin irritation. Prolonged storage of stool in an ileal pouch with incomplete emptying leads to stasis. Pouch stasis is commonly followed by bacterial overgrowth, decreased water absorption, and an increase in short-chain fatty acids, with resultant diarrhea. Patients often experience urgency, frequency, and soiling, as well as occasional systemic symptoms, such as arthralgias.

Factors that appear to enhance ileoanal pouch emptying include a short pouch (<14 cm), no spout, and aggressive correction of outlet obstruction from the pouch.[21] It is apparent from our patients that even a short spout only 1 cm long often elongates after a few years, causing moderate outflow obstruction. We have, therefore, modified our technique for constructing the original pouch during the past 15 years to minimize pouch stasis and enhance the efficiency of emptying. The length of the initial pouch has been reduced to 9 to 12 cm, depending on the age of the patient. We have routinely used a J pouch during the past 8 years, and this has resulted in a marked improvement in long-term pouch function and a much lower incidence of complications.[21] Of our first 300 patients undergoing IPAA, 151 underwent pouch reconstruction (50%), whereas only 13 of our last 300 IPAA patients have required pouch reconstruction (4.3%). The low frequency of complications after pouch reconstruction may in part be related to the good general health and nutrition of the patients and the absence of corticosteroids or immunosuppressive medications or both, which were often present at the initial operation.

Because any obstruction to pouch outflow, from anorectal stenosis or stricture, perirectal sinus, or ulceration of the anal mucosa causing rectal sphincter spasm, may interfere with pouch emptying, we have favored early aggressive treatment of these conditions, and daily home dilatation of any stenosis until it has resolved. Because the efferent limb (spout) extending from the lower end of a pouch to the anal anastomosis does not produce meaningful contractions, it often obstructs outflow from the pouch, analogous to the aganglionic rectum in patients with short-segment Hirschsprung's disease. Therefore, during the past 8 years we have eliminated the spout completely by constructing J pouches.

For patients who have chronic pouch stasis resulting from a previously constructed long or broad pouch, often with an elongated efferent limb (most often with the lateral and S pouches), we have observed a marked and consistent symptomatic improvement when the pouch has been mobilized from the pelvis, shortened and tapered, and then reanastomosed to the anus. For symptomatic patients who have an elongated spout with satisfactory pouch length and configuration, transanal resection of the spout with pouch–anal reanastomosis is a smaller operation and commonly provides excellent results, as has been noted by others.[6,10,11,22] Aggressive surgical correction of identifiable causes of chronic pouch dysfunction has made it possible to avoid pouch removal and permanent ileostomy in the vast majority of patients. As noted by other authors, the complication rate after reconstructive pouch surgery has been low.[14,16] In our experience, the majority of operations can be performed safely without a diverting ileostomy.

For patients who have progressive dysfunction a few years after IPAA due to faulty pouch configuration with stasis, aggressive surgical reconstruction should be consid-

ered as an option to obtain optimal long-term functional results.

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